

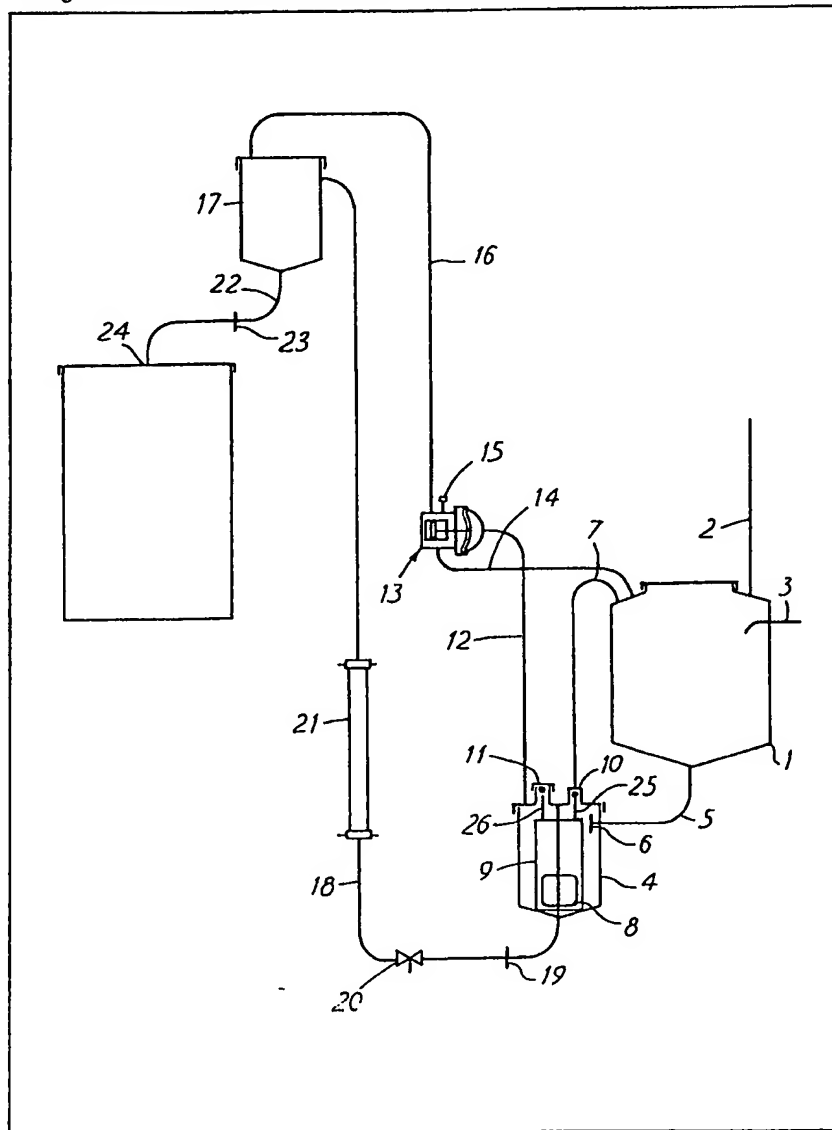
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## (54) Milk conveying mechanism

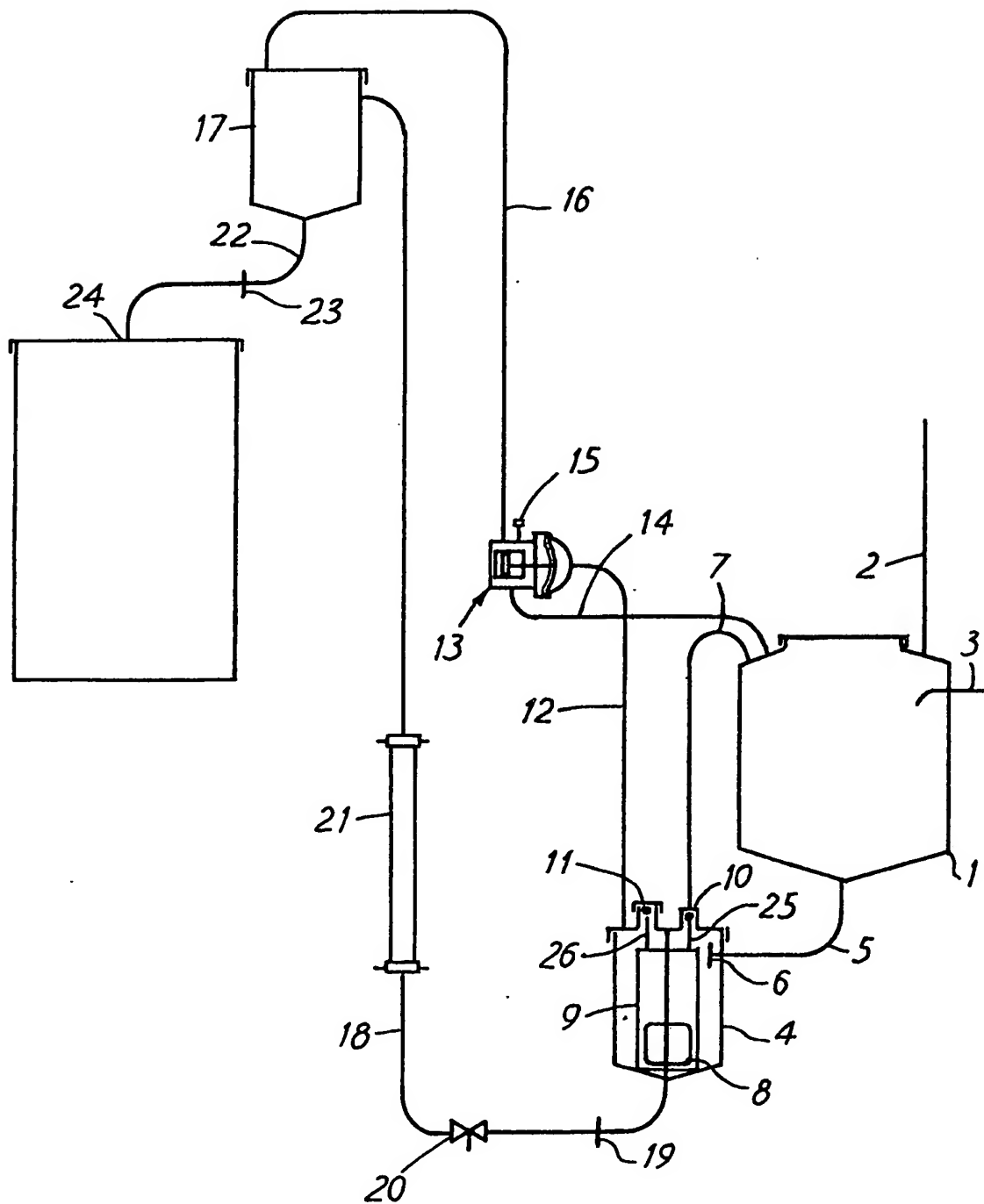
(57) A milk conveying mechanism for use in a vacuum milking machine for discharging the milk in a milk separator 1, which is permanently under a vacuum, into a collecting tank 24 located at a higher level and under atmospheric pressure, comprises a first milk sluice 4 provided with a float 8 connected downstream of the separator. On filling the first sluice with milk, by means of a shifting linkage 9 the float 8 operates valves

10, 11 which close a vacuum line 7 connecting the first sluice to the separator and provide a connection at 11 to the external atmosphere. The first sluice is connected by an airline 12 to an air-operated two-way valve 13 which switches over to vacuum, by means of line 16, a second milk sluice 17 which is initially under atmospheric pressure and is connected downstream of the first sluice via line 18. As a result the milk collected in the first sluice can be sucked off by the second sluice and drained off into the collecting tank 24.



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## SPECIFICATION

## Milk conveying mechanism for vacuum milking machines

The invention relates to a milk conveying mechanism for vacuum milking machines for discharging milk to the atmosphere from a milk separator which is continuously under a vacuum, the milk separator being connected to a milk sluice via a milk drain pipe having a valve flap, and the milk sluice having a float which, on filling with milk operates valves which close a vacuum line connecting the milk sluice to the milk separator and which open a line leading to the external atmosphere.

Such a milk conveying mechanism is generally known, the milk being drained from the milk sluice into lower milk collecting tanks or pipes, which are under atmospheric pressure.

To avoid vacuum losses when milking, in more modern milking machines the milk obtained at the milking positions is transferred by means of milk collecting lines to a milk separator which is normally positioned below the milking position foundation, the milk being conveyed into collecting tanks located at a higher level and at a greater distance.

DOS 24 26 458 discloses a milk conveying mechanism in which a float is provided in the milk sluice connected downstream of the milk separator. On filling the sluice with milk the float opens the airline, which is under vacuum, to the milk separator by means of a valve and at the same time a second valve connected to a pressure line. In this circuit the milk sluice which is initially under a vacuum is placed under overpressure, the valve flap arranged in the valve separator drain line being closed and the milk flap in the milk sluice drain being opened. As a function of the overpressure in the milk sluice the milk is conveyed into the higher tank. The disadvantage of this process is the overpressure required, which must be produced by a corresponding unit.

It is also conventional practice to convey the milk from the milk separator to a higher and more remote collecting tank by means of a downstream-connected electric pump. In addition, a filter is often provided between the pump and the milk collecting tank and serves to purify the milk.

To ensure that the milking positions remain operative even in the case of a power failure, every effort is made to avoid electrically operating units in milking machines.

Therefore the problem of the present invention is to provide a milk conveying mechanism which, whilst only using the vacuum present in the milking machines, drains off the milk from the milk separator into higher-positioned tanks, which are under atmospheric pressure.

According to the invention this problem is solved in that the milk sluice is connected by means of an airline to an air-operated two-way valve and the latter can be operated in such a way that it can switch a second milk sluice, which is

under atmospheric pressure and connected downstream of the first milk sluice, to vacuum, so that the milk collected in the first milk sluice can be sucked off through the second milk sluice.

As a result of the provision of two milk sluices it is possible, whilst only using the vacuum in the milking machine, to drain the milk from the milk separator into the higher-positioned milk collecting tanks, which are under atmospheric pressure, without any pressure loss in the vacuum system. The pressure head of the milk is dependent of the vacuum in the system and the resistance of a filter located in the pipeline.

Further features and characteristics of the milk conveying mechanism according to the invention can be gathered from the subclaims and the following description of an embodiment.

In the diagrammatic drawing 1 is the milk separator, which is connected with a line 2, which is under a permanent vacuum and with a milk collecting line 3, which leads to not shown milking positions. A first milk sluice 4 is connected downstream of the milk separator and is connected via a drain line 5 with a fitted valve flap 6 and a vacuum line 7 to the milk separator. The first milk sluice 4 is provided with a float 8 which, on filling the milk sluice with milk, closes a valve 10 positioned in vacuum line 7 by means of a shifting linkage 9 and opens a ball valve 11 connected to the external atmosphere. From milk sluice 4 also passes a line 12 to a diaphragm-controlled two-way valve 13, which is in turn connected by means of a vacuum line 14 to the milk separator, which is continuously under a vacuum. The two-way valve 13 has a pipe union 15 to atmosphere and a connecting line 16 to a second milk sluice 17, which is connected downstream of the first milk sluice 4. The connection between the first and second milk sluices is constituted by a connecting line 18 in which are provided a valve flap 19, a discharge device 20 and a filter 21. From the second milk sluice 17 a discharge line 22 with a valve flap 23 leads to a milk collecting tank 24, which is under atmospheric pressure.

The milk conveying mechanism functions as follows. At the start of the milking process the milk separator 1 and the first milk sluice 4 is under vacuum by means of lines 5 and 7, as well as the connecting line 18 from the first milk sluice 4 to the closed valve flap 19 and line 12 to the diaphragm-controlled two-way valve 13. The two-way valve is operated in such a way that atmospheric pressure passes via connecting line 16 into the second milk sluice 17 by means of pipe union 15. The connecting line 18 from the second milk sluice to the valve flap 19, as well as discharge line 22, are also under atmospheric pressure.

Once the milk flow from milk collecting line 3 to milk separator 1 has started, milk also flows into the first milk sluice 4 and float 8 therein slowly rises. As soon as the float has reached the upper part of the shifting linkage 9, the latter also rises with the float and a valve tappet 25 connected to

this linkage, causes the valve 10 to the vacuum line 7 and another tappet 26 connected to the linkage opens a ball valve 11 to the atmosphere. As a result of the inflow of atmospheric air into the first milk sluice 4 atmospheric air simultaneously flows via line 12 to two-way valve 13, there being a changeover from atmospheric air to vacuum by means of lines 14 and 16 in the second milk sluice 17. Connecting line 18 is also under a vacuum, so that when valve flap 19 is open the milk from the first milk sluice 4 can flow via line 18 into the second milk sluice, valve flap 23 being closed by the vacuum in the second milk sluice 17.

The conveying of the milk is aided by the atmospheric pressure prevailing in the first milk sluice with valve flap 6 closed. The milk flows through filter 21 incorporated into connecting line 18. As soon as the float in the first milk sluice 4 has reached the bottom of shifting linkage 9 with the milk level falling, valve 10 is opened again and valve 11 closed, so that the first milk sluice 4 is again under vacuum and the second milk sluice 17 is under atmospheric pressure, enabling the milk to flow into milk collecting tank 24, which is under atmospheric pressure from the second milk sluice 17 and with valve flap 23 open. The filling or emptying process can then start again.

The discharge device 20 in connecting line 18 is required for emptying the line at the end of the milking process.

#### List of Reference Numerals

1. Milk separator
2. Vacuum line
3. Milk collecting line
- 35 4. First milk sluice
5. Drain line
6. Valve flap
7. Vacuum line
- 40 8. Float
9. Shifting linkage
10. Valve
11. Ball valve
12. Airline
13. Two-way valve
- 45 14. Vacuum line
15. Pipe union
16. Connecting line

17. Second milk sluice
18. Connecting line
- 50 19. Valve flap
20. Discharge device
21. Filter
22. Discharge line
23. Valve flap
- 55 24. Milk collecting tank
25. Valve tappet
26. Tappet

#### CLAIMS

1. A milk conveying mechanism for vacuum milking machines for discharging milk to the atmosphere from a milk separator which is continuously under a vacuum, the milk separator being connected to a milk sluice via a milk drain pipe having a valve flap, and the milk sluice having a float which, on filling with milk, operates valves which close a vacuum line connecting the milk sluice to the milk separator and open a line leading to the external atmosphere, wherein the milk sluice is connected by means of an airline to an air-operated two-way valve and the latter can be operated in such a way that it can switch a second milk sluice, which is under atmospheric pressure and connected downstream of the first milk sluice, to vacuum, so that the milk collected in the first milk sluice can be sucked off through the second milk sluice.

2. A milk conveying mechanism for vacuum milking machines according to claim 1, wherein the milk sluices are connected by a connecting line having a valve flap.

3. A milk conveying mechanism for vacuum milking machines according to claims 1 and 2, wherein the two-way valve is connected by means of a line, which is under a vacuum, to the milk separator and via a pipe union to the external atmosphere.

4. A milk conveying mechanism for vacuum milking machines according to claims 1 to 3, wherein a filter is provided in the connecting line.

- 90 5. A milk conveying mechanism for vacuum milking machines substantially as described herein with reference to and as shown in the accompanying drawings.